

# Sockeye Sour

Reference ID

Origin: California, USA

## API Gravity

18.8

ESD 97

## Equation(s) for Predicting Evaporation

$$\%Ev = (1.32 + 0.045T)\ln(t)$$

Where %Ev = weight percent evaporated; T = surface temperature ( $^{\circ}\text{C}$ ); t = time (minutes)

ESD 97

## Sulphur (weight %)

### Evaporation

(weight %)

0

4.41

ESD 97

10

4.71

19

5.02

## Water Content (weight %)

### Evaporation

(weight %)

0

0.6

ESD 98

10

0.1

19

<0.1

## Flash Point ( $^{\circ}\text{C}$ )

### Evaporation

(weight %)

0

-3

ESD 97

10

67

19

>95

## Density (g/mL)

### Evaporation

(weight %)

0

### Temperature

( $^{\circ}\text{C}$ )

0.9514

ESD 97

15

0.9409

25

0.9362

ESD 98

10

0

0.9787

ESD 97

15

0.9682

25

0.9616

ESD 98

19

0

1.0006

ESD 97

15

0.9838

25

0.9840

ESD 98

## Pour Point ( $^{\circ}\text{C}$ )

### Evaporation

(weight %)

0

-22

ESD 97

10

-3

19

18

## Dynamic Viscosity (mPa s or cP)

### Evaporation

(weight %)

0

### Temperature

( $^{\circ}\text{C}$ )

3281

ESD 97

15

821

25

470

ESD 98

10

0

63950

ESD 97

15

8708

25

3351

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## Dynamic Viscosity (mPa s or cP)

| Evaporation<br><u>(weight %)</u> | Temperature<br><u>(°C)</u> |          |     |        |
|----------------------------------|----------------------------|----------|-----|--------|
| 19                               | 0                          | 22920000 | (a) | ESD 97 |
|                                  | 15                         | 475200   |     |        |
|                                  | 25                         | 97280    |     | ESD 98 |

(a) shear rate = 0.01/s

## Emulsion Formation

| Evaporation<br><u>(weight%)</u> |                      |            |  |        |
|---------------------------------|----------------------|------------|--|--------|
| 0                               | Visual stability     | stable     |  | ESD 98 |
|                                 | Viscosity (mPa·s)    | 32000      |  |        |
|                                 | Complex modulus (Pa) | 120        |  |        |
|                                 | Water content (wt %) | 74         |  |        |
| 10                              | Visual stability     | mesostable |  |        |
|                                 | Viscosity (mPa·s)    | 79000      |  |        |
|                                 | Complex modulus (Pa) | 300        |  |        |
|                                 | Water content (wt %) | 60         |  |        |
| 19                              | Visual stability     | unstable   |  |        |
|                                 | Water content (wt %) | 10         |  |        |

## Chemical Dispersibility (volume %)

| Evaporation<br><u>(weight %)</u> |              |   |     |        |
|----------------------------------|--------------|---|-----|--------|
| 0                                | Corexit 9500 | 0 |     | ESD 99 |
| 10                               |              | 0 | (a) |        |
| 19                               |              | 0 | (a) |        |

(a) inferred

## Hydrocarbon Groups (weight %)

| Evaporation<br><u>(weight %)</u> |             |    |  |        |
|----------------------------------|-------------|----|--|--------|
| 0                                | Saturates   | 38 |  | ESD 98 |
|                                  | Aromatics   | 29 |  |        |
|                                  | Resins      | 20 |  |        |
|                                  | Asphaltenes | 13 |  |        |
| 10                               | Saturates   | 29 |  |        |
|                                  | Aromatics   | 31 |  |        |
|                                  | Resins      | 22 |  |        |
|                                  | Asphaltenes | 17 |  |        |
| 19                               | Saturates   | 26 |  |        |
|                                  | Aromatics   | 30 |  |        |
|                                  | Resins      | 22 |  |        |
|                                  | Asphaltenes | 24 |  |        |

## Adhesion (g/m<sup>2</sup>)

| Evaporation<br><u>(weight %)</u> |  |     |         |        |
|----------------------------------|--|-----|---------|--------|
| 0                                |  | 75  | SD = 8  | ESD 98 |
| 10                               |  | 98  | SD = 17 |        |
| 19                               |  | 605 | SD = 61 |        |

## Volatile Organic Compounds (ppm)

| Evaporation<br><u>(weight %)</u> |              |      |  |        |
|----------------------------------|--------------|------|--|--------|
| 0                                | Benzene      | 444  |  | ESD 97 |
|                                  | Toluene      | 2494 |  |        |
|                                  | Ethylbenzene | 826  |  |        |

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## Volatile Organic Compounds (ppm)

| Evaporation<br><u>(weight %)</u> |              |       |  |        |
|----------------------------------|--------------|-------|--|--------|
| 0                                | Xylenes      | 2983  |  | ESD 97 |
|                                  | C3-benzenes  | 4753  |  |        |
|                                  | Total BTEX   | 6748  |  |        |
|                                  | Total VOCs   | 11500 |  |        |
| 10                               | Benzene      | 30    |  |        |
|                                  | Toluene      | 500   |  |        |
|                                  | Ethylbenzene | 376   |  |        |
|                                  | Xylenes      | 1576  |  |        |
|                                  | C3-benzenes  | 3850  |  |        |
|                                  | Total BTEX   | 2483  |  |        |
|                                  | Total VOCs   | 6333  |  |        |
| 19                               | Benzene      | 0     |  |        |
|                                  | Toluene      | 3     |  |        |
|                                  | Ethylbenzene | 3     |  |        |
|                                  | Xylenes      | 3     |  |        |
|                                  | C3-benzenes  | 16    |  |        |
|                                  | Total BTEX   | 9     |  |        |
|                                  | Total VOCs   | 26    |  |        |

## Surface Tension (mN/m or dynes/cm)

| Evaporation<br><u>(weight %)</u> | Temperature<br><u>(°C)</u> |      |        |
|----------------------------------|----------------------------|------|--------|
| 0                                | 0                          | 30.3 | ESD 97 |
|                                  | 15                         | 28.9 |        |
|                                  | 25                         | 27.9 | ESD 00 |
| 10                               | 0                          | NM   | ESD 97 |
|                                  | 15                         | 30.8 |        |
|                                  | 25                         | 29.8 | ESD 00 |
| 19                               | 0                          | NM   | ESD 97 |
|                                  | 15                         | NM   |        |
|                                  | 25                         | NM   | ESD 98 |

## Oil/Salt Water Interfacial Tension (mN/m or dynes/cm)

| Evaporation<br><u>(weight %)</u> | Temperature<br><u>(°C)</u> |      |        |
|----------------------------------|----------------------------|------|--------|
| 0                                | 0                          | 24.8 | ESD 97 |
|                                  | 15                         | 20.1 |        |
|                                  | 25                         | NM   | ESD 00 |
| 10                               | 0                          | NM   | ESD 97 |
|                                  | 15                         | NM   |        |
|                                  | 25                         | NM   | ESD 00 |
| 19                               | 0                          | NM   | ESD 97 |
|                                  | 15                         | NM   |        |
|                                  | 25                         | NM   | ESD 98 |

## Oil/Fresh Water Interfacial Tension (mN/m or

| Evaporation<br><u>(weight %)</u> | Temperature<br><u>(°C)</u> |      |        |
|----------------------------------|----------------------------|------|--------|
| 0                                | 0                          | 23.1 | ESD 97 |
|                                  | 15                         | 22.9 |        |
|                                  | 25                         | NM   | ESD 00 |
| 10                               | 0                          | NM   | ESD 97 |
|                                  | 15                         | NM   |        |
|                                  | 25                         | NM   | ESD 00 |
| 19                               | 0                          | NM   | ESD 97 |

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## Oil/Fresh Water Interfacial Tension (mN/m or

| Evaporation<br><u>(weight %)</u> | Temperature<br><u>(°C)</u> | NM | ESD 97 |
|----------------------------------|----------------------------|----|--------|
| 19                               | 15                         | NM | ESD 98 |

## Boiling Point Distribution (weight %)

| Evaporation<br><u>(weight %)</u> | Boiling Point<br><u>(°C)</u> | Weight % |        |
|----------------------------------|------------------------------|----------|--------|
| 0                                | 40                           | 3        | ESD 97 |
|                                  | 60                           | 4        |        |
|                                  | 80                           | 6        |        |
|                                  | 100                          | 7        |        |
|                                  | 120                          | 7        |        |
|                                  | 140                          | 9        |        |
|                                  | 160                          | 11       |        |
|                                  | 180                          | 13       |        |
|                                  | 200                          | 15       |        |
|                                  | 250                          | 21       |        |
|                                  | 300                          | 27       |        |
|                                  | 350                          | 35       |        |
|                                  | 400                          | 42       |        |
|                                  | 450                          | 50       |        |
|                                  | 500                          | 58       |        |
|                                  | 550                          | 65       |        |
|                                  | 600                          | 71       |        |
|                                  | 650                          | 78       |        |
|                                  | 700                          | 83       |        |
| 10                               | 140                          | 1        |        |
|                                  | 160                          | 2        |        |
|                                  | 180                          | 4        |        |
|                                  | 200                          | 6        |        |
|                                  | 250                          | 13       |        |
|                                  | 300                          | 20       |        |
|                                  | 350                          | 29       |        |
|                                  | 400                          | 39       |        |
|                                  | 450                          | 49       |        |
|                                  | 500                          | 58       |        |
|                                  | 550                          | 66       |        |
|                                  | 600                          | 74       |        |
|                                  | 650                          | 81       |        |
|                                  | 700                          | 87       |        |
| 19                               | 250                          | 4        |        |
|                                  | 300                          | 11       |        |
|                                  | 350                          | 21       |        |
|                                  | 400                          | 32       |        |
|                                  | 450                          | 43       |        |
|                                  | 500                          | 53       |        |
|                                  | 550                          | 62       |        |
|                                  | 600                          | 70       |        |
|                                  | 650                          | 78       |        |
|                                  | 700                          | 85       |        |

## Boiling Point Distribution (°C)

| Evaporation<br><u>(weight %)</u> | Weight % | Boiling Point<br><u>(°C)</u> |        |
|----------------------------------|----------|------------------------------|--------|
| 0                                | 5        |                              | ESD 97 |

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## Boiling Point Distribution (°C)

| Evaporation<br><u>(weight %)</u> | Weight % | Boiling Point<br><u>(°C)</u> |  |
|----------------------------------|----------|------------------------------|--|
| 0                                | 10       |                              |  |
|                                  | 15       |                              |  |
|                                  | 20       |                              |  |
|                                  | 25       |                              |  |
|                                  | 30       |                              |  |
|                                  | 35       |                              |  |
|                                  | 40       |                              |  |
|                                  | 45       |                              |  |
|                                  | 50       |                              |  |
|                                  | 55       |                              |  |
|                                  | 60       |                              |  |
|                                  | 65       |                              |  |
|                                  | 70       |                              |  |
|                                  | 75       |                              |  |
|                                  | 80       |                              |  |
|                                  | 85       |                              |  |
| 10                               | 5        |                              |  |
|                                  | 10       |                              |  |
|                                  | 15       |                              |  |
|                                  | 20       |                              |  |
|                                  | 25       |                              |  |
|                                  | 30       |                              |  |
|                                  | 35       |                              |  |
|                                  | 40       |                              |  |
|                                  | 45       |                              |  |
|                                  | 50       |                              |  |
|                                  | 55       |                              |  |
|                                  | 60       |                              |  |
|                                  | 65       |                              |  |
|                                  | 70       |                              |  |
|                                  | 75       |                              |  |
|                                  | 80       |                              |  |
|                                  | 85       |                              |  |
| 19                               | 5        |                              |  |
|                                  | 10       |                              |  |
|                                  | 15       |                              |  |
|                                  | 20       |                              |  |
|                                  | 25       |                              |  |
|                                  | 30       |                              |  |
|                                  | 35       |                              |  |
|                                  | 40       |                              |  |
|                                  | 45       |                              |  |
|                                  | 50       |                              |  |
|                                  | 55       |                              |  |
|                                  | 60       |                              |  |
|                                  | 65       |                              |  |
|                                  | 70       |                              |  |
|                                  | 75       |                              |  |
|                                  | 80       |                              |  |
|                                  | 85       |                              |  |